Claims

1. Balancing weight (1) for vehicle wheels, with a weight body (7), which has a concavely or convexly curved contact face (2) for contact with a convexly or concavely curved rim portion (3, 5) of the wheel, in particular with a rim flange (4), characterised in that the contact face (2) is divided into plural consecutive lateral sections (11a, 11b, 11c, 11d, 11e), which are defined from one another by bends (12), edges and/or different sizes of curvature.

2. Balancing weight according to claim 1, characterised by a manufacture of the weight body (7) from or comprising zinc, steel, copper, brass, tungsten, gold, silver and/or an alloy comprising one or more of the abovementioned materials or another material or alloy, which is respectively harder than lead, including glass.

3. Balancing weight according to claim 1 or 2, characterised in that one, more or all the lateral sections (11a, 11b, 11c, 11d, 11e) extend along circular curves or with respectively constant curvatures.

4. Balancing weight according to claim 1, 2 or 3, characterised in that the curvatures or progressions of the plural lateral sections (11a, 11b, 11c, 11d, 11e) are formed on the basis of two differently dimensioned radii of curvature (R1-R5).

5. Balancing weight according to claim 4, characterised in that a central one (11c) of the lateral sections (11a, 11b, 11c, 11d, 11e), extends on the basis of the largest (R3) of the radii of curvature (R1-R5).

6. Balancing weight according to one of the preceding claims, characterised in that at least one of the lateral sections (11a, 11b, 11c, 11d, 11e), optionally a central one (11c), extends rectilinearly or on the basis of an infinitely long radius of curvature.

7. Baiancing weight according to one of claims 1 to 5, characterised in that the contact face (2) is formed exclusively with curved lateral sections (11a, 11b, 11c, 11d, 11e) on the basis of radii of curvature (R1-R5) which are smaller than infinite.

8. Balancing weight according to one of the preceding claims, characterised in that two outer lateral sections (11a, 11e) which form the two ends (8) of the contact face (2) are respectively curved on the basis of the smallest (R1, R5) of the radii of curvature (R1-R5).

9. Balancing weight according to claim 8, characterised by the use of at least three entirely or partially different radii of curvature (R1-R5) for the formation of the lateral sections (11a, 11b, 11c, 11d, 11e), wherein the largest radius of curvature (R3) is allocated to a central lateral section (11c) and the smallest radius of curvature is allocated to the two end lateral sections (11a, 11e) of the contact face (2).

10. Balancing weight according to claim 9, characterised by the use of more than three entirely or partially different radii of curvature (R1-R5) for the formation of the lateral sections (11a, 11b, 11c, 11d, 11e), wherein the radii of curvature (R2, R4) lying between the largest and smallest radius of curvature (R3, R1) in size are allocated to the lateral sections (11b, 11d) which lie between the central (11c) and the two end lateral sections (11a, 11e).

11. Balancing weight according to one of the preceding claims, characterised by three consecutive lateral sections (11a, 11b, 11c, 11d, 11e) each having different radii of curvature (R1-R5).

12. Balancing weight according to claim 1 or 5, characterised in that the lateral sections (11a, 11b, 11c, 11d, 11e; Fig. 5) are exclusively rectilinear or extend

on the basis of an infinitely long radius of curvature and form an open polygonal section.

13. Balancing weight according to claim 12, characterised in that the lateral sections are connected together via obtuse angles and/or corners, edges or bends (12).

14. Balancing weight according to claim 12 or 13, characterised in that hypothetical extensions of lateral sections (11a, 11b, 11c, 11d, 11e) form acute angles (α, β, δ, γ) with adjacent lateral sections (11a, 11b, 11c, 11d, 11e).

15. Balancing weight according to one of claims 12 to 14, characterised in that the acute angles (α, β, δ, γ) increase with distance from the central region (9) and/or are largest in the lateral sections (11a, 11e) in the end regions (8).

16. Balancing weight according to claim 1, characterised in that the curvatures of the individual lateral sections (11a, 11b, 11c, 11d, 11e) are not constant and/or the correspond to the progression of a parabola, hyperbola and/or ellipse.

17. Balancing weight according to one of the preceding claims, characterised by identically formed lateral sections (11a, 11e; 11b, 11d) in pairs in particular with respect to a hypothetical line of symmetry.

18. Balancing weight according to one of the preceding claims, characterised by a structurally integral clamping or holding element (6) preferably of spring steel, in particular cast preferably centrally in the weight body (7).

19. Balancing weight according to one of the preceding claims, characterised in that the bends (12), corners or edges have different lengths of distance from one another.

20. Method of manufacture of a balancing weight (1) according to one of claims 2-10 and optionally one of the other claims for vehicle wheels, having a weight body (7), which has a concavely or convexly curved contact face (2) for contact with a convexly or concavely curved rim portion (3, 5) of the wheel, in particular with a rim flange (4), characterised in that the contact face is formed with a number n = 3, 4, 5 ... of consecutive lateral sections (11a, 11b, 11c, 11d, 11e), which are defined from one another by different sizes of curvature.

21. Method of manufacture according to claim 20, wherein the associated radii of curvature R1, R2, ... Rn are respectively constant and are dimensioned according to the following rules:

a) the first radius of curvature R1 is to the left-hand (or right-hand) end of the contact face and the last radius of curvature Rn is to the right-hand (or left-hand) end of the contact face;

b) u < R1, Rn < o, wherein u is a lower and o and upper measure for the radius of curvature;

c) with the following case distinction:

Case A: n is an even number and is at least 4: o = 4, 6, 8, ... etc.

u < R1 < o

R2 > R1

R3 >= R2

R4 >= R3

R5 >= R4

...

R(n/2) >= R(n/2-1)

R(n/2+1) <= R(n/2)

R(n/2+2) <= (R(n/2+1)

...

R(n-1) <= R(n-2)

Rn < R(n-1)

u < Rn < o

Case B: n is an odd number and is at least 3: n = 3, 5, 7, ... etc.

u < R1 < o

R2 > R1

R3 >= R2

R4 >= R3

R5 >=R4

...

R((n+1)/2)>= R((n+1)/2-1)

R((n+1)2+1)<= R((n+1)/2)

R((n+1)2+2) <= R((n+1)2+1)

...

R(n-1) <= R(n-2)

Rn < R(n-1)

u < Rn < o

22. Method of manufacture according to claim 21, characterised in that the radius of curvature is at least u = 120 mm and at most o = 600 mm.

23. Method of manufacture according to one of the preceding claims, characterised in that at least one of the radii of curvature (R1-R5), preferably one allocated to a middle lateral section (11c), is dimensioned with an amount going to infinity.

24. Method of manufacture according to one of the preceding claims, characterised in that at least one of the lateral sections (11a, 11b, 11c, 11d,

11e), in particular a middle one (11c), is dimensioned with a curved or linear length of about 40 mm to 60 mm.

Altered claims

[Received at the International Office on 16th November 2004 (16.11.04), original claims 1-24 replaced by altered claims 1-23]

1. Balancing weight (1) for vehicle wheels, having a weight body (7) which has a concavely or convexly curved contact face (2) for contact with a convexly or concavely curved rim portion (3, 5) of the wheel, in particular with a rim flange (4), and having a clamping element (6) which is structurally integral or is provided subsequently with a holding spring, wherein the contact face (2) is divided into plural consecutive lateral sections (11a, 11b, 11c, 11d, 11e), which are defined from one another by bends (12), characterised in that at least three lateral sections (11a, 11b, 11c, 11d, 11e) are formed for contact with the rim portion and are joined together in a row via respective obtuse-angled bends (12).

2. Balancing weight according to claim 1, characterised by the manufacture of the weight body (7) from or comprising zinc, steel, copper, brass, tungsten, gold, silver and/or an alloy comprising one or more of the abovementioned materials or another material or alloy, which is respectively harder than lead, including glass.

3. Balancing weight according to claim 1 or 2, characterised in that one, more or all of the lateral sections (11a, 11b, 11c, 11d, 11e) extend along circular curves or with respectively constant curvatures.

4. Balancing weight according to claim 1, 2, or 3, characterised in that the curvatures or progressions of the plural lateral sections (11a, 11b 11c, 11d, 11e) are formed on the basis of at least two differently dimensioned radii of curvature (R1-R5)

5. Balancing weight according to claim 4, characterised in that a central one (11c) of the lateral sections (11a, 11b, 11c, 11d, 11e) extends on the basis of the largest (R3) of the radii of curvature (R1-R5).

6. Balancing weight according to one of the preceding claims, characterised in that at least one of the lateral sections (11a, 11b, 11c, 11d, 11e), optionally a central one (11c), extends rectilinearly or on the basis of an infinitely long radius of curvature.

7. Balancing weight according to one of claims 1 to 5, characterised in that the contact face (2) is formed exclusively with curved lateral sections (11a, 11b, 11c, 11d, 11e) on the basis of radii of curvature (R1-R5) which are smaller than infinite.

8. Balancing weight according to one of the preceding claims, characterised in that two outer lateral sections (11a, 11e) which form the two ends (8) of the contact face (2) are curved respectively on the basis of the smallest (R1, R5) of the radii of curvature (R1-R5).

9. Balancing weight according to claim 8, characterised by the use of at least three entirely or partially differently sized radii of curvature (R1-R5) for shaping the lateral sections (11a, 11b, 11c, 11d, 11e), the largest radius of curvature (R3) being allocated to a middle lateral section (11c), and the smallest radius of curvature being allocated to the two end lateral sections (11a, 11e) of the contact face (2).

10. Balancing weight according to claim 9, characterised by the use of at least three entirely or partially differently sized radii of curvature (R1-R5) for shaping the lateral sections (11a, 11b, 11c, 11d, 11e), the radii of curvature (R2, R4) lying between the largest and smallest radius of curvature (R3, R1) in size being allocated to lateral sections (11b, 11d) which lie between the middle (11c) and the two end lateral sections (11a, 11e).

11. Balancing weight according to one of the preceding claims, characterised by at least three lateral sections (11a, 11b, 11c, 11d, 11e) respectively following one another with different radii of curvature (R1-R5).

12. Balancing weight according to claim 1 or 5, characterised in that the lateral sections (11a, 11b, 11c, 11d, 11e; Fig. 5) are exclusively rectilinear or extend on the basis of an infinitely long radius of curvature and form an open polygonal section.

13. Balancing weight according to claim 12, characterised in that hypothetical extensions of lateral sections (11a, 11b, 11c, 11d, 11e) form acute angles (α, β, δ, γ) with adjacent lateral sections (11a, 11b, 11c, 11d, 11e).

14. Balancing weight according to one of claims 12 or 13, characterised in that the acute angles (α, β, δ, γ) increase as the distance from the middle region (9) increases and/or are largest in the lateral sections (11a, 11e) in the end regions (8).

15. Balancing weight according to claim 1, characterised in that the curvatures of the individual lateral sections (11a, 11b, 11c, 11d, 11e) are not constant and/or correspond to the progression of a parabola, a hyperbola and/or an ellipse.

16. Balancing weight according to one of the preceding claims, characterised by identically formed lateral sections (11a, 11e; 11b, 11d) in particular formed in pairs with respect to a hypothetical line of symmetry.

17. Balancing weight according to one of the preceding claims, characterised in that the clamping element (6) is cast centrally and/or is composed of spring steel.

18. Balancing weight according to one of the preceding claims, characterised in that the bends (12) have different distances from one another.

19. Method of manufacturing a balancing weight (1) according to one of the preceding claims for vehicle wheels, having a weight body (7) which has a concavely or convexly curved contact face (2) for contact with a convexly or concavely curved rim portion (3, 5) of the wheel, in particular with a rim flange (4), wherein the contact face (2) is divided into plural consecutive lateral sections (11a, 11b, 11c, 11d 11e) which are defined with respect to one another by bends (12), characterised in that the contact face is formed with a number n = 3, 4, 5, ... of consecutive lateral sections (11a, 11b, 11c, 11d, 11e) which follow one another respectively with different radii of curvature (R1-R5).

20. Method of manufacturing according to claim 19, characterised in that the associated radii of curvature R1, R2, ... Rn are each constant and are dimensioned according to the following rules:

a) the first radius of curvature R1 is to the left-hand (or right-hand) end of the contact face and the last radius of curvature Rn is to the right-hand (or left-hand) end of the contact face;

b) u < R1, Rn < o, wherein u is a lower and o and upper measure for the radius of curvature;

c) with the following case distinction:

Case A: n is an even number and is at least 4: o = 4, 6, 8, ... etc.

u < R1 < o

R2 > R1

R3 >= R2

R4 >= R3

R5 >= R4

...

R(n/2) >= R(n/2-1)

R(n/2+1) <= R(n/2)

R(n/2+2) <= (R(n/2+1)

...

R(n-1) <= R(n-2)

Rn < R(n-1)

u < Rn < o

Case B: n is an odd number and is at least 3: n = 3, 5, 7, ... etc.

u < R1 < o

R2 > R1

R3 >= R2

R4 >= R3

R5 >=R4

...

R((n+1)/2)>= R((n+1)/2-1)

R((n+1)2+1)<= R((n+1)/2)

R((n+1)2+2) <= R((n+1)2+1)

...

R(n-1) <= R(n-2)

Rn < R(n-1)

u < Rn < o

21. Method of manufacture according to claim 20, characterised in that the radius of curvature is at least u = 120 mm and at most o = 600 mm.

22. Method of manufacture according to one of the preceding claims, characterised in that at least one of the radii of curvature (R1-R5), preferably

one allocated to a middle lateral section (11c), is dimensioned with an amount going towards infinity.

23. Method of manufacture according to one of the preceding claims, characterised in that at least one of the lateral sections (11a, 11b, 11c, 11d, 11e), in particular a middle one (11c), is dimensioned with a curved or linear length of about 40 mm to 60 mm.